BACKGROUND AND SUMMARY OF THE INVENTION

A process for preparing the re-starting of a spinning process

The present invention relates to a process involving the preparation for re-starting a spinning process after an interruption of the spinning process in a spinning arrangement comprising an airjet aggregate, whereby an end of an already spun thread is hereby fed back through the airjet aggregate in the opposite direction to the operational direction of motion to a thread storer, there temporarily positioned and subsequently transported in spinning direction again.

The present inventions relates further to an arrangement for carrying out this process, comprising an airjet aggregate, a drafting unit arranged upstream thereof and also comprising a thread storer, designed as a suction tube and also arranged upstream of the airjet aggregate, for the temporary take-up of an end of a thread already fed into the airjet aggregate.

A process and an arrangement of this type is prior art in European published patent 0 807 699. The thread storer designed as a suction tube is located in this case between the drafting unit and the airjet aggregate and takes up not only the end of the thread fed back through the airjet aggregate in the opposite direction to the spinning direction, but also a staple fibre strand to be bound with this thread. Overlapping occurs hereby between the thread and the staple fibre strand in the suction tube. The thread is not prepared for restarting the spinning process, therefore the joining up of the thread with the fibre strand is left more or less to chance as soon as the thread is transported together with the fibre strand in spinning direction again.

It is known in European published patent application 1 219 737 that the end area of the thread is prepared and in particular that a tapering is applied to the thread. Accordingly, the start of the staple fibre strand, which connects with the end of the thread, is also thinned out. This allegedly creates a high-quality connecting point. The above mentioned publication leaves open the question of the realization of the tapering process of the end of the thread. Neither is a thread storer for positioning the end of the thread disclosed.

In the non-generic German published patent 23 66 255 it is known for the piecing of a thread in an open-end rotor spinning aggregate that the end of the thread is subject to a stream of compressed air and that the end unravels to form a kind of paintbrush, which allegedly has a certain similarity with the fibre ring located in the spinning rotor, to which the end of the thread is to be joined.

It is an object of the present invention in the preparation for re-starting a spinning process to prepare the thread to be pieced to the stable fibre strand in such a way that a high-quality connection point can be created.

This object has been achieved in accordance with the present invention in that in the thread storer the end of the thread is separated from the thread as waste, thus creating a new thread end which is prepared for the re-starting of the spinning process.

The present invention is based on the latest findings of the applicant that the old end of a thread resulting from an end break looks, as a rule, very arbitrary, thus excluding the possibility that, when the spinning process is re-started, exact reproducible conditions are to hand. It is therefore provided that every torn end of the thread to be applied to the staple fibre strand is removed as waste, whereby the length of the thread is calculated in such a way that the newly formed thread end is located in a section of the thread which contains no spinning defects. The new thread end is then prepared for the re-starting of the spinning process, for example, on the one hand for generating a tapering according to the mentioned European published patent application 1 219 737 and on the other hand with regard to its length in order that reproducible conditions are present at all times.

In the thread storer, which is preferably designed as a suction tube, the point of separation for generating a new thread end is prepared firstly by means of blowing compressed air thereon. When subsequently the old end to be discharged is separated by means of pulling the thread apart, a paint-brush type of tapering occurs inevitably in the new thread end, which lessens material thickening when it is joined with the staple fibre strand. This prepared new thread end has not been adversely affected by the previous interruption in the spinning process, as the old end is transported away as waste.

Due to blowing with compressed air, the location of the point of separation is determined so that, with regard to the length of the new thread end, reproducible conditions are always provided. The piece of waste thread can be transported away into the vacuum source connected with the suction tube.

The end to be removed as waste is advantageously nipped and the thread to be joined with the staple fibre strand is subsequently transported in its operational spinning direction and thus pulled apart and separated from the waste piece. Here, in order to prepare the new thread end, the transport of the thread, which takes place in any case, can be utilized to good advantage. This transport is then carried out advantageously by a delivery roller pair, which is an integral part of the spinning process.

For carrying out the process, the thread storer, here in accordance with the present invention in the form of a suction tube, has a nipping line for temporarily holding the thread as well as a compressed air nozzle for blowing air onto the thread. The above mentioned delivery roller pair is advantageously the front roller pair of the drafting unit which is arranged upstream of the airjet aggregate.The reproducible length of the new thead end can be achieved in that a predetermined distance is left between the compressed air nozzle and the front roller pair of the drafting unit or also between the compressed air nozzle and the airjet aggregate.

It is advantageous when the thread storer containing the suction tube is a component part of a maintenance device assigned to a number of spinning arrangements. The effort involved in the preparation of a new thread end can thus be kept to a minimum.

BRIEF DESCRIPTION OF THE DRAWINGS

These and further objects, features and advantages of the present invention will become more readily apparent from the following detailed description thereof when taken in conjunction with the accompanying drawings wherein:

Figure 1 is a schematic depiction of an spinning arrangement comprising an airjet aggregate and comprising the thread storer according to present invention,

Figures 2, 3 and 4 show in greatly enlarged detail the generating of a new thread end.

DETAILED DESCRIPTION OF THE DRAWINGS

The spinning arrangement in Figure 1, shown only partly and schematically, serves the spinning of a thread 1 from a staple fibre strand 2. The spinning arrangement comprises an airjet aggregate 3 as an essential component part, which, for example, can be designed according to the mentioned European published patent application 1 219 737, also comprising a drafting unit 4 preferably designed as a three-cylinder drafting unit, also comprising a withdrawal roller pair 5 and a winding device (not shown).

In the drafting unit 4, the staple fibre strand 2 is drafted in the known way in drafting direction A to the desired degree of fineness. The drafting zone ends at a delivery roller pair 6, which comprises a drivable lower roller 7 and a top roller 8 which can be swivelled into position 8'. This delivery roller pair 6 forms the front roller pair of the drafting unit 4.

The airjet aggregate 3 comprises a feed channel 9, to which the drafted but still twist-free staple fibre strand 2 is fed for receiving its spinning twist, as well as a withdrawal channel 10 for the spun thread 1. In the inside of the airjet aggregate 3, among other parts, a vortex chamber (not shown) is located, in which the actual twisting process takes place, as described for example in the above mentioned European published patent application 1 219 737. The spinning direction is denoted by the letter B.

The winding device (not shown), which comprises a crosswound bobbin, onto which the spun thread 1 is wound, is arranged in withdrawal direction C downstream of the withdrawal roller pair 5, which also comprises a top roller which can be swivelled.

Due to certain circumstances, for example an end break, the normal spinning process is temporarily interrupted. In such a case the spinning process must be re-started. Advantageously, the drives are temporarily shut down when the spinning process is interrupted.

In order to re-start the spinning process again, several preparatory operational steps are necessary. Amongst others, a piece of the already spun thread 1, here denoted by the reference number 11, must be manually or automatically transported through the airjet aggregate 3 in the opposite direction to the normal spinning direction B, so that this thread 11 can be joined again with the start of the staple fibre strand 2 which is still located in the drafting unit 4.

In Figure 1, the old end of the thread 11 to be joined to the staple fibre strand 2, is denoted by the reference number 12. This end 12 is, as already mentioned, threaded with the thread 11 through the airjet aggregate 3 and the opened delivery roller pair 6 in the opposite direction to the operational spinning direction B. The end 12 is temporarily positioned in a thread storer 13, designed as a suction tube 14, whereby the direction of the acting vacuum is denoted by the arrow D.

For reasons mentioned above, the old end 12 of the thread 11 to be joined to the staple fibre strand 2 is, as a rule, not suitable. The old end 12 is therefore separated as waste 16 in the thread storer 13 from the thread 11 and discharged in direction D into the vacuum source. In its place, at a point of separation 20, a new, more suitable thread end 15 is created in the thread storer 13, see also the description of Figures 2 to 4 below.

In order to make this possible, the thread storer 13, designed as a suction tube 14, comprises on the one hand a nipping line 17 for temporarily holding the thread 11 as well as a compressed air nozzle 18 for blowing air onto the thread 11. The nipping line 17 can be hereby activated in the direction of the double arrow with the aid of a pressure spring, while an operating valve 19 is assigned to the compressed air nozzle 18.

In a way to be explained in more detail below, the point of separation 20 in the thread 11 is prepared first by means of blowing compressed air onto said thread 11. The new thread end 15 can subsequently be separated from the waste piece 16 by means of pulling the thread 11 apart. Due to the pneumatic preparation, the new thread end 15 always forms at the point of separation 20, that is, at the predetermined place. While the blowing of compressed air and the pulling apart of the thread 11 is taking place, the thread piece to be discharged as waste 16 is held nipped at the nipping line 17. The thread 11 with the new thread end 15 can, in contrast, be transported through the re-closed delivery roller pair 6, in connection with the also closed withdrawal roller pair 5 in spinning direction B. As soon as the new thread end 15 has reached a certain predetermined position during this transport, the transport of the staple fibre strand 2 is also set in motion, so that a point of connection forms between the thread 11 and the staple fibre strand 2 with predetermined overlapping length.

In order to discharge the compressed air blown into the suction tube 14 by the compressed air nozzle 18, a discharge opening 21 can be provided in the area of the point of separation 20.

The thread storer 13 is advantageously a component part of a travelling maintenance device 22 and is positioned exactly in a predetermined position in relation to the spinning arrangement requiring maintenance. There is always a predetermined distance x between the point of separation 20 and the delivery roller pair 6. The point of separation 20 is laid down by the position of the compressed air nozzle 18. Whether the distance x is measured to the top roller 8 of the delivery roller pair 6 or to the entry opening of the feed channel 9 or otherwise, is ultimately of no importance. Essential is only that, during its transport in spinning direction B, the new thread end 15 is located at a predetermined position when it is joined again with the staple fibre strand 2.

With the aid of the greatly enlarged Figures 2, 3 and 4, the generation and preparation of a new thread end 15 is explained in more detail.

Figure 2 shows first the thread 11, with its old, useless end 12, threaded through the airjet aggregate 3 in the opposite direction to its spinning direction B. The thread 11 is faultlessly spun up to a sufficient distance from this end 12. Because of the special spinning process in this case, which applies the use of an airjet aggregate 3, the thread 11 ist not evely twisted, but rather has a special twist character. The thread 11 comprises to a great extent a core of essentially in thread longitudinal direction extending fibres or fibre areas without any significant twist, as well as an outer area, in which the fibres or fibre areas are twined around the core. The core fibres 23 and the outer fibres 24 twined around the core 23 can be seen in the schematic depiction shown in Figure 2.

In Figure 3 the area of the point of separation 20 is denoted by a dot-dash circle. At this point, the compressed air nozzle 18 blows compressed air traversely onto the thread 11 in the suction tube 14. The thread 11 can be already nipped in the nipping line 17 at this moment, although this is not absolutely necessary. The blowing of compressed air onto the thread 11 effects the release of the twined around fibres 24, in that these fibres 24 receive a partial twist in the opposite direction, so that the bond effecting the tensile strength of the thread 11 is destroyed at the point of separation 20, thus imparting a weak point to the thread 11, at which it tears.

When, as shown in Figure 4, the waste piece 16 containing the old end 12 is nipped at the nipping line 17 and the thread 11 is transported in its spinning direction B, the thread 11 is pulled apart at the point of separation 20, namely at the predetermined point, whereby the thread 11 with its new end 15 tapers off to a narrowing thread tip. This new thread end 15 is suitable for joining to the staple fibre strand 2 without any greater thickening of the thread. The waste piece 16, containing the uncontrolled end 12, whose form is dependent on chance, can be removed.